Transport, Thermal Expansion and Redox Properties of Ce0,80RE0,20O2- (RE=Pr, Tb) Solid Solutions

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Transport, thermal expansion and redox properties of $Ce_{0,80}RE_{0,20}O_{2-\delta}$ (RE=Pr, Tb) solid solutions

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The structure, thermal/chemical expansion coefficients, electronic conductivity and redox properties of $Ce_{0,80}RE_{0,20}O_{2-\delta}$ (RE=Pr, Tb) solid solutions, prepared by co-precipitation, are investigated. The thermal expansion coefficients range between $12 \cdot 10^{-6}$ K^{-1} and $45 \cdot 10^{-6}$ K^{-1} depending on temperature and composition, while the chemical expansion coefficients are in accordance to the Vegard's slope expected for the change in ionic radius due to reduction of the dopants. The electronic conductivity is measured as a function of the oxygen partial pressure in the range from 10^{3} to 10^{-20} bar for temperatures between 600°C and 900°C, using the Hebb-Wagner polarization technique. The electronic conductivity is highest for the 20 at.% Pr doped composition, being significantly enhanced relative to that of CGO in the high-P_{O2} regime. The valence of Pr and Tb are further investigated by XANES measurements of the Pr and Tb L3 white lines.